

Paratypes. COSTA RICA. 23 May 1986, *I. Chacón 1892* (CR); Parque Nacional Braulio Carrillo, Quebrada Molinete, 13 Feb. 1984, *L. Gómez et al. 21091* (CR). **Alajuela:** Cantón de Alajuela, Cordillera Central, Sarapiquí, entre Cariblanco y Virgen del Socorro, y orillas del Río Sarapiquí, 10°15'25"N, 84°10'20"W, 21 Aug. 1994, *A. Rojas 1387* (CR, INB); Cantón de Alajuela, Cordillera Central, Cariblanco, camino a Virgen del Socorro y orillas del Río Sarapiquí, 10°15'25"N, 84°10'20"W, 22 Feb. 1995, *A. Rojas 1679* (CR, INB, MO); N slope of ridge along quebrada draining E to Río Cataratitas, ca. 20 km NW of San Ramón, 10°13'N, 84°32'W, 3 Feb. 1986, *A. Smith et al. 2272* (CR, MO, UC); Cantón de San Ramón, Dist. Ángeles Norte, Cordillera de Tilarán, Sendero el Polígono, 10°13'10"N, 84°35'20"W, 8 May 1996, *A. Soto et al. 8* (CR, INB). **Cartago:** Cantón de Turrialba, Tayutic, Jicotea, Finca La Pradera, subiendo la fila hacia San Antonio, 9°47'15"N, 83°33'15"W, 14 June 1995, *G. Herrera 7881* (CR, F, MO); Cantón de Turrialba, Cordillera Central, Tayutic, Jicotea, 9°47'15"N, 83°32'50"W, 22 June 1995, *A. Rojas et al. 2051* (CR, INB). **Limón:** Pococí, Guápiles, Parque Nac. Braulio Carrillo, Est. Quebrada González, Sendero Las Palmas, 10°09'44"N, 83°56'17"W, 14 May 2006, *A. Cascante & J. Sánchez 1567* (CR); Cantón de Talamanca, Bratsi, Sukut, desembocadura del Río Sukut en el Río Urén, camino al SE, hacia Purisqui, 9°23'30"N, 83°58'00"W, 7 July 1989, *B. Hammel et al. 17576* (CR, MO); Cantón de Pococí, Llanura de Santa Clara, Teleférico, de la calle a la estación, 10°10'22"N, 83°54'32"W, 21 July 1995, *A. Rojas & G. Rivera 2080* (CR, INB, MO); Cantón de Pococí, Parque Nac. Braulio Carrillo, Cordillera Central, Est. Quebrada González, Río Sucio, Sendero Botarrama, 10°09'58"N, 83°56'30"W, 9 May 1995, *A. Rojas et al. 1791* (CR, INB); Cantón de Limón, R. I. Chirripó, Fila Matama, Almirante, 09°46'12"N 083°19'48"W, 10 Aug. 1995, *A. Rojas et al. 2266* (INB, MO); Cantón de Pococí, Parque Nac. Braulio Carrillo, Est. Quebrada González, Sendero Palmas, 10°09'50"N, 83°56'20"W, 21 Nov. 1997, *A. Rojas et al. 3994* (CR, INB, MO); Pococí, Parque Nac. Braulio Carrillo, Sendero

Botarrama, 0.5 km después del Río Sucio en la carretera en dirección a Guápiles, 10°09'00"N, 83°56'45"W, 12 Aug. 2001, *A. Rojas 5464* (CR, INB). PANAMA. **Chiriquí:** Dam site, 7 Feb. 1985, *H. van der Werff & C. Hardeveld 6617* (MO). **Veraguas:** vic. Escuela Agrícola Alto Piedra, near Santa Fe, along trail to top of Cerro Tute, 6 Oct. 1979, *T. Antonio 1978* (MO); vic. of Santa Fe, along road betw. Alto Piedra & Calovébora, 0.5 mi. N of Alto Piedra, on slopes of Cerro Tute, Parque Nac. Cerro Tute, 15 July 1994, *T. Croat & G. Zhu 76912* (MO).

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Three New Montane Forest Myrtaceae from Espírito Santo, Brazil

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ABSTRACT. Three new species of Myrtaceae from montane forests of the southeastern Brazilian state of Espírito Santo are described, illustrated, and compared with related species: *Eugenia crassa* Sobral, *Myrcia santateresana* Sobral, and *M. tumida* Sobral. *Eugenia crassa* is closely affined to *E. umbrosa* O. Berg, from which it is set apart by the smaller and wider leaves (to 170×75 mm in *E. crassa* vs. to 200×50 mm), axillary inflorescences, and flowers with larger bracteoles (to 8 mm in *E. crassa* vs. to 2 mm); *M. santateresana* is related to *M. badia* (O. Berg) N. Silveira, from which the new species differs by its smaller leaves (to 140×50 mm in *M. santateresana* vs. to 200×50 mm) with discontinuous marginal veins and smaller (buds to 2 mm in *M. santateresana* vs. to 4 mm), glabrous flowers without a calyx tube; *M. tumida* is close to *M. guianensis* (Aubl.) DC., differing by its swollen calyx lobes, larger fruits (to 18 mm in *M. tumida* vs. to 10 mm), and longer petioles (to 13 mm in *M. tumida* vs. to 6 mm).

RESUMO. São descritas e ilustradas três novas espécies de Myrtaceae da floresta ombrófila montana do Espírito Santo, Brasil: *Eugenia crassa* Sobral, *Myrcia santateresana* Sobral e *M. tumida* Sobral. *Eugenia crassa* é próxima de *E. umbrosa* O. Berg, diferindo pelas folhas menores e mais largas (até 170×75 mm em *E. crassa* vs. até 200×50 mm), inflorescências axilares e flores com bractéolas maiores (até 8 mm em *E. crassa* vs. até 2 mm); *M. santateresana* é próxima a *M. badia* (O. Berg) N. Silveira, diferindo pelas folhas menores (até 140×50 mm em *M. santateresana* vs. até 200×50 mm) com nervura marginal descontínua, flores glabras e menores (botões até 2 mm em *M. santateresana* vs. até 4 mm) e tubo do cálice ausente; e *M. tumida* é próxima a *M. guianensis* (Aubl.) DC., da qual difere pelas flores com lobos do cálice engrossados, frutos maiores (até 18 mm em *M. tumida* vs. até 10 mm) e pecíolos mais longos (até 13 mm em *M. tumida* vs. até 6 mm).

Key words: Brazil, Espírito Santo, *Eugenia*, IUCN Red List, *Myrcia*, Myrtaceae.

The central region of the southeastern Brazilian state of Espírito Santo (ca. $19^{\circ}30' - 20^{\circ}00'S$, $40^{\circ}30' - 41^{\circ}00'W$) presents a mountainous relief with altitudes

up to 1200 m and was originally covered by dense forest (Atlantic rainforest). The region was intensely deforested, and presently only a few continuous forested areas survive (Mendes & Padovan, 2000). Botanical collections in this region are scarce, except for recent efforts of the Museu de Biologia Mello Leitão in Espírito Santo, with intensive surveys in the municipality of Santa Teresa and adjacent areas. During an inventory of the Myrtaceae in Santa Teresa, three undescribed species were detected and are here described and illustrated.

1. *Eugenia crassa* Sobral, sp. nov. TYPE: Brazil. Espírito Santo: Santa Teresa, Santo Antônio, terreno do Bosa, 14 Jan. 1999, L. Kollmann & E. Bausen 1563 (holotype, MBML; isotype, BHCB). Figure 1.

Species haec *Eugeniae umbrosae* O. Berg proxima, a qua inflorescentiis axillaribus terminalibusve, bracteolis ellipticis deltoideisve majoribus et foliis aveniis minoribusque recedit.

Tree 10–12 m tall; twigs and abaxial side of young leaves with arachnoid rufescent trichomes to 0.2 mm, twigs apically terete or subquadrate, 5–8 mm thick. Leaves with petioles $15 - 18 \times 2.8 - 4$ mm; blades lanceolate to oblong, $140 - 170 \times 45 - 75$ mm, leathery, discolored when dry, adaxially glabrous, the abaxial side with trichomes that fall irregularly in mature leaves, apex widely acute to obtuse, base cuneate or obtuse; midvein plane or weakly sulcate adaxially, strongly raised and sometimes longitudinally wrinkled abaxially; lateral veins 12 to 16 on each side, scarcely or not visible on both sides, occasionally faintly raised abaxially; marginal vein 3–5 mm from the margin, occasionally a second vein ca. 1 mm, the margin itself strongly revolute and with a yellowish or brownish girdle 0.2–0.5 mm wide. Inflorescences axillary or terminal, racemiform (bracteate shoots sensu Landrum & Kawasaki, 1997), $5 - 20 \times 2 - 5$ mm, with 2 to 4 flowers. Flowers with pedicels $2 - 4 \times$ ca. 2 mm; bracteoles concealing the ovary, elliptic or ovate, $7 - 8 \times 6 - 8$ mm, glabrous or sparsely covered with appressed rufescent trichomes 0.1–0.2 mm, persistent at anthesis; flower buds obpyriform, ca. $15 \times 10 - 12$ mm; ovary pilose, with densely appressed rufescent



Figure 1. *Eugenia crassa* Sobral, isotype specimen (L. Kollmann & E. Bausen 1563, BHCB).

trichomes to 0.1 mm, markedly distinct from the calyx lobes, these 4, glabrous, ovate-triangular, unequal, the external pair 7–8 × 10–12 mm and the internal pair 8–9 × ca. 10 mm; petals orbicular, 10–14 mm diam.;

stamens ca. 200, 7–8 mm, anthers ovate-oblong, 1–1.3 × ca. 0.5 mm, with one apical gland (petals and stamens measured in pre-anthesal buds; in open flowers they may be larger); staminal ring rounded, ca.

10 mm diam.; style to 10 mm, stigma punctiform; ovary bilocular with ca. 30 ovules per locule. Fruits globose or somewhat oblate, 25–28 × ca. 30 mm, single-seeded, immature in the collections examined; seed globose-elliptic, 20–22 × ca. 20 mm; embryo with 2 fused cotyledons and no visible hypocotyl.

Distribution, habitat, and phenology. *Eugenia crassa* is a tree from Atlantic montane forests at altitudes of 750–800 m. The new taxon is currently known only from the municipality of Santa Teresa, and is noted to flower in January and fruit in October.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), *Eugenia crassa* is assessed here as Endangered (EN), fitting criteria B1ab(iii). Its known area of occurrence is smaller than 5000 km² (criterion B1), since the municipality of Santa Teresa has an area of 695 km² (IBGE, 2010), and it grows in a fragmented habitat (criterion a) with continuing decline in extension (criterion b[iii]), since only 18% of the area of Santa Teresa retains its original vegetation (Mendes & Padovan, 2000: 16).

Etymology. The specific epithet is taken from the Latin “crassus,” meaning “thick,” alluding to the overall aspect of the exsiccatae, with leathery leaves and robust twigs.

Taxonomic affinities. *Eugenia crassa*, due to the overall aspect of the leaves and the indumentum on the leaves and flowers, is apparently related to *E. umbrosa* O. Berg, a species collected in the nearby state of Rio de Janeiro (Berg, 1857–1859: 582). The two species can be distinguished by the characters described in the following key couplet:

- 1a. Inflorescences ramiflorous, the axes to 2 mm; bracteoles ovate, to 2 mm; leaves with petioles to 8 mm and blades 170–200 × 48–50 mm, the venation clearly manifest on both faces *E. umbrosa*
 1b. Inflorescences axillary or terminal, axes 5–20 mm; bracteoles elliptic or ovate, 7–8 mm; leaves with petioles 15–18 mm and blades 140–170 × 45–75 mm, the venation scarcely visible on both faces. *E. crassa*

Paratypes. BRAZIL. **Espírito Santo:** Santa Teresa, Santo Antônio, Terreno do Bosa, 7 Oct. 1998, L. Kollmann, E. Bausen & W. Pizziolo 714 (MBML, MO), L. Kollmann, E. Bausen & W. Pizziolo 718 (BHCB, MBML).

2. *Myrcia santateresana* Sobral, sp. nov. TYPE: Brazil. Espírito Santo: Santa Teresa, São Lourenço, Reserva Biol. de São Lourenço, trilha do Caravagem, 3 Feb. 1999, L. Kollmann, E. Bausen & W. Pizziolo 1793 (holotype, MBML; isotype, BHCB). Figure 2.

Species haec *Myrciae badiae* (O. Berg) N. Silveira proxima, a qua foliis minoribus discoloribusque nervis

marginalibus interruptis et floribus glabris minoribus hypanthio nullo recedit.

Tree 9–12 m tall; plants glabrous except for scattered simple hyaline trichomes 0.1–0.3 mm on the inflorescences; twigs ochraceous or pale yellow, moderately exfoliating, terete, 1–2 mm thick. Leaves with blades lanceolate to lanceolate-obovate, 80–140 × 35–50 mm, strongly discolored in dried specimens, apex acute to acuminate, base cuneate; midvein sulcate adaxially and raised abaxially; lateral veins 12 to 15 at each side, evident on both faces and raised abaxially; marginal veins 2, the inner one somewhat discontinuous, 3–4 mm, the outer one ca. 1 mm from the margin; petioles 8–10 × 1.5–1.7 mm. Inflorescences terminal, paniculiform, up to 3 times ramified, the main axis 100–160 × 1–3 mm; bracts lanceolate, ca. 0.8 × 0.3 mm, occasionally persisting. Flowers sessile or with pedicels to 0.5 × 0.3 mm; bracteoles lanceolate, 0.5–0.7 × ca. 0.3 mm, deciduous at anthesis; flower buds globose to obovate, 1.5–2 × ca. 1.5 mm; calyx lobes 5, unequal in size, triangular to rounded, 1–1.5 × 1–2 mm, reflexed at anthesis; petals white, rounded to obovate, ca. 2 × 2 mm; stamens ca. 50 (mostly fallen; estimated by scars on the staminal ring), ca. 2 mm, anthers elliptic, ca. 0.4 × 0.2 mm, apparently devoid of apical glands; staminal ring rounded, 1–1.3 mm diam.; calyx tube absent; style 3–4 mm, stigma punctiform; ovary bilocular with 2 centrally attached ovules per locule. Fruits globose, 5–6 mm diam., immature in the collections examined; seeds 1 to 2, with membranous testa; embryo immature, not distinguishable.

Distribution, habitat, and phenology. *Myrcia santateresana* is a tree from montane forests at altitudes of 750–850 m. It is presently known only from the municipality of Santa Teresa. The new species was observed to flower in December and February, with fruits in March.

IUCN Red List category. This species can be considered as Endangered (EN), according to IUCN Red List criteria (IUCN, 2001), fitting criteria B1ab(iii); for an explanation of these criteria see the text under *Eugenia crassa*, since the conditions described for this species also apply to *Myrcia santateresana*.

Taxonomic affinities. *Myrcia santateresana*, due to the shape of its leaves and venation pattern, is apparently related to *M. badia* (O. Berg) N. Silveira, native from Bahia (Berg, 1857–1859: 547, as *Aulomyrcia badia* O. Berg). The two species can be distinguished by the characters described in the following key couplet:

- 1a. Leaves 150–200 × 35–55 mm, concolorous or not markedly discolored; lateral veins to 20 or more at

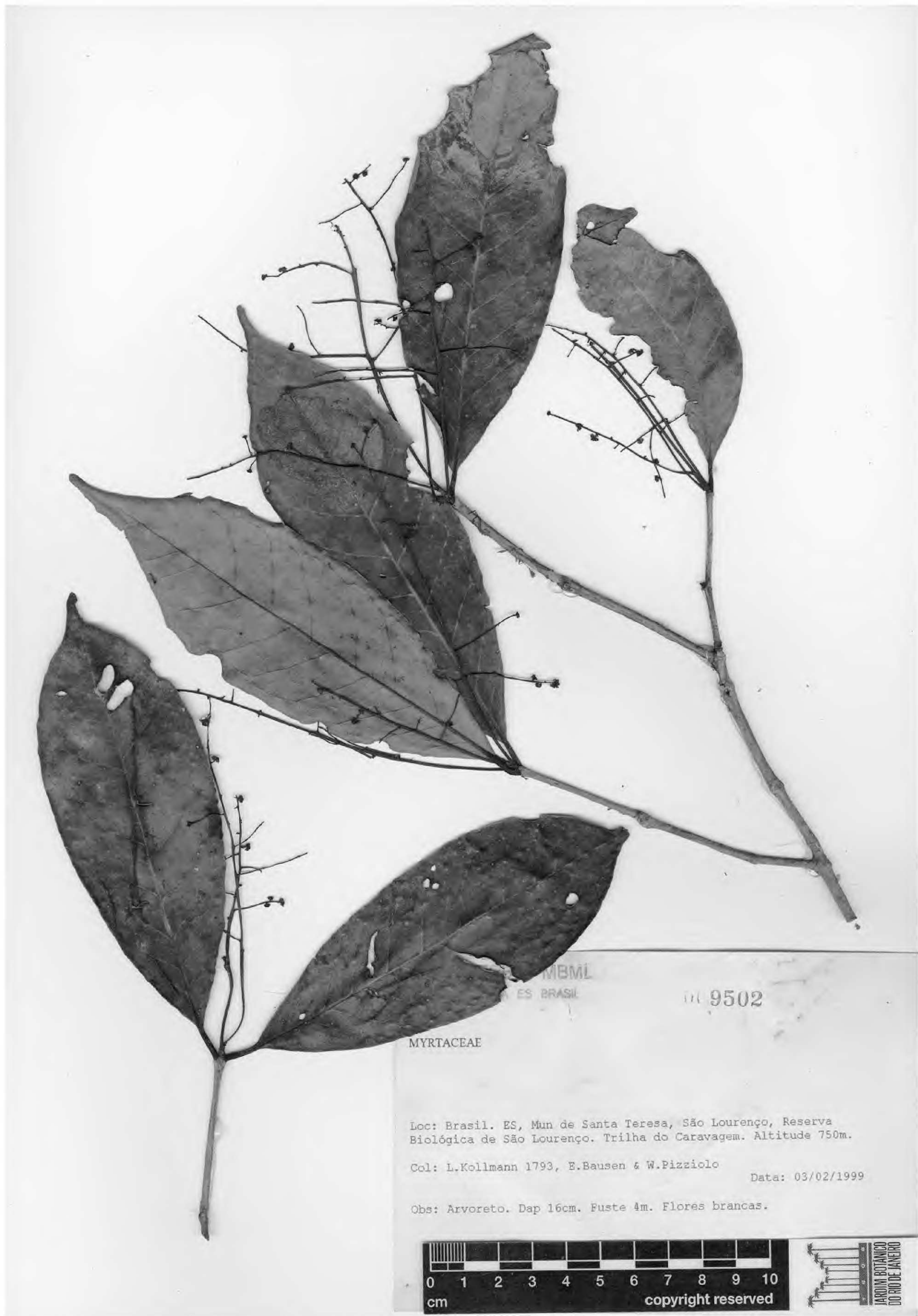


Figure 2. *Myrcia santateresana* Sobral, isotype specimen (L. Kollmann, E. Bausen & W. Pizziolo 1793, BHCB).

each side, forming a continuous marginal vein; flowers pilose, sessile at the apex of inflorescence branches; buds to 4 mm; calyx tube present . . . *M. badia*

1b. Leaves 80–140 × 35–50 mm, markedly discoloured; lateral veins to 15 at each side, forming a discontinuous inner marginal vein; flowers gla-

brous, sessile along the inflorescence branches; buds to 2 mm; calyx tube absent . . . *M. santateresana*

Paratypes. BRAZIL. **Espírito Santo:** Santa Teresa, Reserva Biol. Caixa D'Água, trilha do Caravagem, 29 Dec. 1998, L. Kollmann & E. Bausen 1371 (BHCB, MBML);

cabeceira do 25 de julho, terreno do Furlani, 11 Mar. 1999, L. Kollmann, E. Bausen & W. Pizziolo 2153 (MBML, MO).

3. *Myrcia tumida* Sobral, sp. nov. TYPE: Brazil. Espírito Santo: Santa Teresa, Valsugana Velha, Reserva Biol. Santa Lúcia, 28 Jan. 1999, L. Kollmann, E. Bausen & W. Pizziolo 1736 (holotype, MBML; isotype, BHCB). Figure 3.

Species haec *Myrciae guianensis* (Aubl.) DC. proxima, a qua florum lobis calycinis adaxialiter praesertim dimidio superiore planis vel convexis et tumidis, fructibus majoribus et petiolis longioribus recedit.

Shrub or treelet to 5 m tall; plants glabrous except for very scattered rufescent dibrachiate trichomes to 0.4 mm in young leaves and grayish or brownish simple trichomes ca. 0.1 mm at the adaxial side of calyx lobes; twigs terete, grayish or brownish, 1–2 mm thick. Leaves with petioles 10–13 × 1–1.2 mm; blades elliptic-oblong, oblong-obovate, or widely elliptic, 80–110 × 30–60 mm, concolorous or slightly discolored when dry and with evident glandular dots 0.1–0.2 mm diam., apex obtuse to widely acute, rarely retuse, base cuneate; midvein plane or sulcate, rarely slightly raised adaxially and evident abaxially; lateral veins 15 to 17 at each side, scarcely evident to weakly raised on both sides; marginal vein 1–2 mm from the sometimes revolute margin. Inflorescences with 3 to 7 flowers, sometimes reduced to only 1 flower, then the axis looking like a pedicel to 15 mm, more commonly racemiform or paniculiform, then ramified only once, the axis 35–65 × ca. 1.5 mm; flowers sessile or pedicels 2–2.5 × ca. 0.5 mm; bracteoles not seen; flower buds globose or obovate, 3–4 × ca. 4 mm, with visible glandular dots; calyx lobes ovate, erect at anthesis, sometimes unequal in size, 1–2 × ca. 2 mm, internally with trichomes to 0.1 mm, the apex adaxially plane or convex, in this case seeming a little swollen and to 1 mm thick; petals white, rounded or obovate, 3–4 × 2–3 mm; stamens ca. 80, 4–5 mm, the anthers globose, ca. 0.3 × 0.3 mm, with one apical gland; calyx tube present, 0.8–1 mm deep; style 7–8 mm, the stigma punctiform and finely papillate; ovary 3-locular, with 2 centrally attached ovules per locule. Fruits globose or oblate, yellowish as far as known, 10–17 × 10–18 mm; seeds widely reniform, to 10 × 7–8 mm, the testa brown, shining; embryo with 2 folded cotyledons and hypocotyl.

Distribution, habitat, and phenology. *Myrcia tumida* is a tree from Atlantic montane forests at altitudes from 600–950 m. It has been collected only from the municipalities of Santa Leopoldina and Santa

Teresa. The new species flowers in January and fruits in May and July.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), this species can be considered as Endangered (EN), fitting criteria B1ab(iii), since its known area of occurrence is smaller than 5000 km² (criterion B1), and since the municipalities of Santa Leopoldina and Santa Teresa have, respectively, areas of 716 km² and 695 km² (IBGE, 2010). *Myrcia tumida* grows in a fragmented habitat (criterion a) with a continuing decline in extension (criterion b[iii]), since only 18% of the area of Santa Teresa still retains its original vegetation (Mendes & Padovan, 2000: 16) and, since the occupation history and land use of the municipality of Santa Leopoldina is similar, possibly only a small part of its original vegetation has remained.

Etymology. The specific epithet is taken from the Latin “tumidus,” meaning “swollen,” alluding to the form of the calyx lobes.

Taxonomic affinities. *Myrcia tumida*, due to the form of its leaves and venation, is related to the widespread *M. guianensis* (Aubl.) DC. The two species can be distinguished by the characters described in the following key couplet:

- 1a. Calyx lobes uniformly concave, never swollen and complanate distally; mature fruits globose, to 10 mm diam.; leaves with blades to 70 × 20 mm and petioles to 6 × 1 mm *M. guianensis*
- 1b. Calyx lobes concave only proximally or not concave at all, swollen and complanate to convex distally; mature fruits globose or oblate, 10–17 × 10–18 mm; leaves with blades to 110 × 60 mm and petioles to 13 × 1.2 mm *M. tumida*

Paratypes. BRAZIL. **Espírito Santo:** Santa Leopoldina, Cachoeira da Fumaça, 3 July 1984, W. Boone 245 (BHCB, MBML); Santa Teresa, mata do Tabajara, Jan. 1997, M. Sobral, C. Bassi, H. Boudet Fernandes & G. Hupp 8277 (BHCB, K, MBM, MO); Cabeceira do rio Bonito, radar, 31 Jan. 2002, L. Kollmann & E. Bausen 5451 (BHCB, MBML); Nova Lombardia, Reserva Biológica Augusto Ruschi, trilha da divisa, 24 May 2002, R. Vervloet, W. Pizziolo & E. Bausen 287 (MBML, MO), 10 Apr. 2003, R. Vervloet, E. Bausen & W. Pizziolo 2217 (MBML), 28 July 2004, L. Kollmann 6598 (MBML).

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Figure 3. *Myrcia tumida* Sobral, isotype specimen (L. Kollmann, E. Bausen & W. Pizziolo 1736, BHCB).

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